

41 A Cell So Small

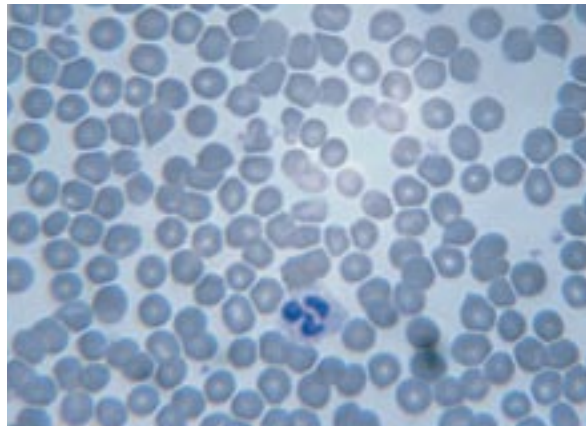


Some organisms, like bacteria, consist of only one cell. Other organisms consist of several to many cells. An adult human being is made up of approximately 10 trillion cells. One drop of human blood, has about 500 *million* cells!

Why do some cells need to be so small? Why aren't multicellular organisms like people made up of just one huge cell instead? Find out by modeling large and small cells.



Why are cells so small?



Red blood cells are the most numerous cells in blood.

MATERIALS



For each group of four students

- 1 bottle of blue food coloring
- 1 plastic cup, $\frac{1}{2}$ full with water
- 1 SEPUP tray
- 1 SEPUP filter funnel
- 2 pieces of filter paper
- 1 30-mL graduated cup
- 2 10-mL vials with caps
- 1 stir stick
- 2 pieces of carbon
carbon powder
- 1 dropper (optional)

**SAFETY**

Be careful when handling carbon. It is messy and can ruin your clothes. Never place any carbon directly onto a counter; use a piece of paper or a paper towel. Be sure to carefully clean up any spills. Be careful not to inhale the powder.

PROCEDURE

1. Fold 2 pieces of filter paper into cones as shown below: first fold each paper in half and then in half again. Open each filter paper into a cone (pull one piece to one side and push the rest to the other side).



FOLDING FILTER PAPER INTO A CONE

2. Place the plastic SEPUP filter funnels over large Cups C and D of your SEPUP tray, as shown here. Then place a filter paper cone into each of the funnels.



SETTING UP THE FILTER

3. Dye your cup of water blue by adding 2 drops of blue food coloring. Stir.
4. *Model large cells:* Place 2 pieces of carbon into one of the 10-mL vials.
5. *Model small cells:* Using the scoop on a stir stick, your teacher will measure out the same volume of carbon powder into the other vial. You should now have the same amount of carbon in each of the two vials.

6. *Model how well the cells can take up oxygen or nutrients they need to live:* Use your 30-mL cup to add 7.5 mL of dyed water to each vial. Then cap the vials and shake each vial ten times.
7. Open the vial containing the carbon pieces. Pour the mixture through the filter paper over Cup C.
8. Open the vial containing the carbon powder. Pour the mixture through the filter paper over Cup D.
9. Observe and record the color of the water in each large cup of your SEPUP tray.
10. Clean up as directed by your teacher.

ANALYSIS



1. In this model, what did each of the following represent?
 - a. carbon powder
 - b. carbon pieces
 - c. blue dye
2. What happened to the blue dye in each vial? Explain.
3. According to the model, which cells—large or small—are most efficient at taking up oxygen and nutrients from the environment? Explain.
4. What is one reason multicellular organisms, such as people, are made up of many small cells instead of one large cell?